

ONCE TOP-SECRET U-2 SPY PLANE ALIVE AND WELL IN NEW CIVILIAN ROLE

(EDITOR'S NOTE: The once top-secret Air Force U-2 spy plane is now wearing a civilian hat. AEROSPACE DAILY associate editor Peter Masley was granted permission by NASA to visit its Wallops Island Station where one of the aircraft was based for high-altitude survey flights over the Chesapeake Bay. He was permitted to photograph the aircraft on takeoff and interview the NASA program manager. Following is his dispatch.)

The famous U-2 spy plane--whose overflights tantalized and aggravated Soviet Union defenses at least four years until they shot one in down in 1960--has left the "black Air Force" for NASA's civilian fleet to probe the ecological secrets of the U. S.

The new space agency program reached a milestone Wednesday as a blue-and-white NASA U-2 completed the first cycle in a series of overflights at five continental U. S. regions. The cycle, overflights at each region about every 18 days until the Earth Resources Technology Satellite (ERTSA) is launched next March or by the end of fiscal 1972, was completed by a 14-year-old U-2 which spent five and a half hours and 1800 miles photographing the Chesapeake Bay region of the East Coast, shooting more than 700 frames from four high resolution cameras at 65,000 feet.

With a full fuel load, the U-2 took off from NASA's Wallops Island (Va.) station Wednesday with a gross weight of 22,500 pounds. It was airborne about 600 feet down the runway and disappeared from eyesight in less than 30 seconds. Program officials said it takes about 20 minutes to reach photographic altitude of 65,000 feet. Cruise speed is 400 knots.

The U-2 lifted off at about 50% throttle. Officials said that with less fuel aboard and more throttle, it would be airborne even faster. It can fly 3000 miles without refueling and the U-2 at Wallops Island Wednesday flew in from Ames Research Center in California non-stop.

It carries four British-made Vinton cameras shooting 70 milimeter film in four light spectrums. Sensor package aboard the Chesapeake Bay region overflight weighed about 200 pounds, and program officers would like to raise it over 400 pounds.

Built At Kelly Johnson's 'Skunk Works'

The single-seat aircraft was built in Kelly Johnson's "skunk works" at Lockheed during the 1950's for high altitude reconnaissance over the Soviet Union and China while the Pentagon was developing and perfecting earth-orbiting surveillance satellites. Russian overflights were stopped in 1960 after the Soviet Union shot down Francis Gary Powers in one of the Lockheed aircraft.

Courtesy of the Air Force, NASA has indefinite possession of two U-2s for earth surveys. The aircraft were built in 1956 and 1957 for the Air Force.

Martin Knutson, manager of the Earth Resources Aircraft Program at Ames, told AEROSPACE DAILY the Air Force "made it known last fall" that two U-2s might be declared surplus to the service's needs. Along with other federal agencies, NASA put in a bid for the two high altitude planes and won approval from the President's Office of Management and Budget last spring for the transfer and the project that Knutson heads.

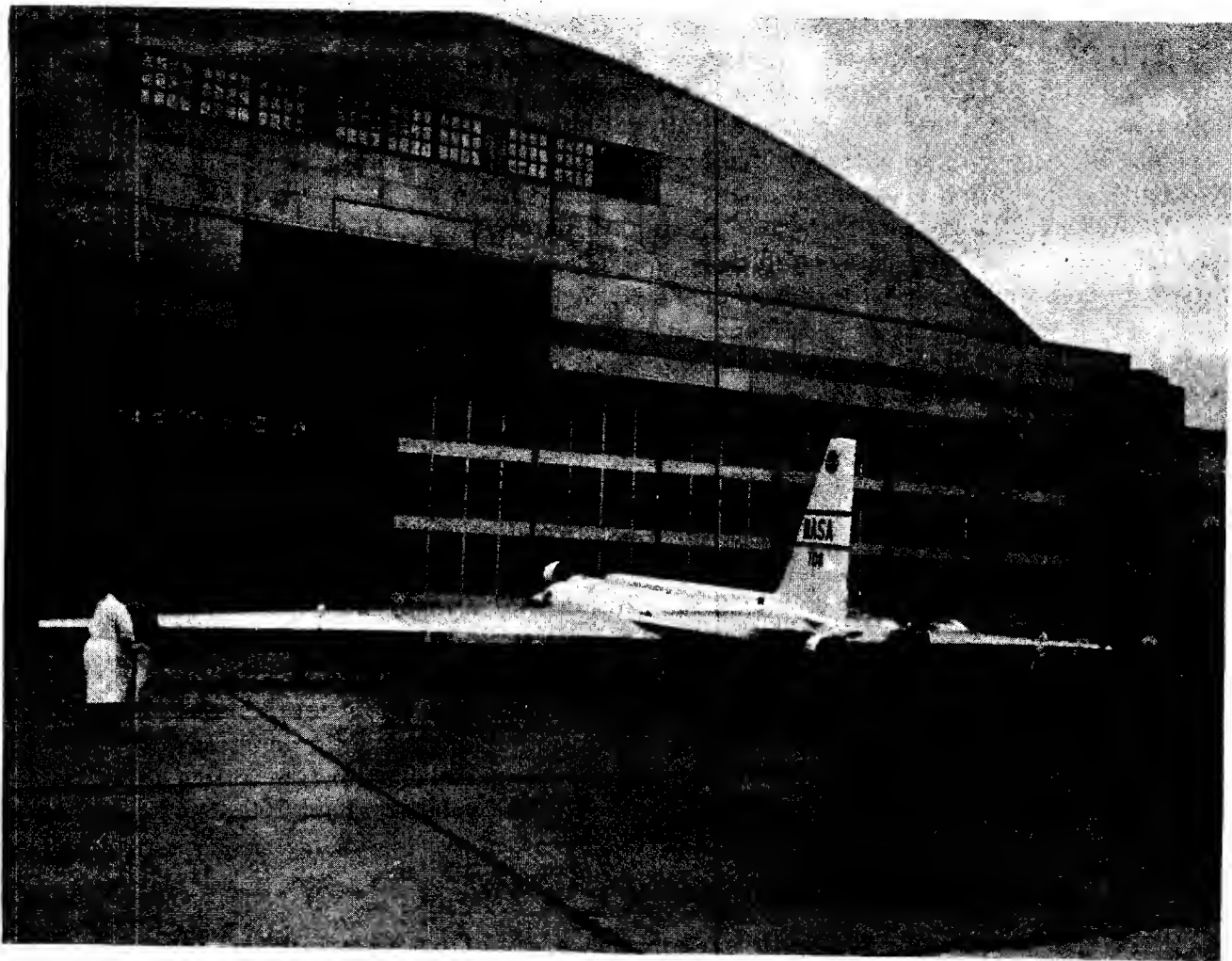
Shortly after administration approval, the space agency announced the new program. It noted that the U-2s "are capable of sustained flight at very high altitudes, thereby providing ideal platforms for remote sensing of large areas."

The U-2 is not only ideal, Knutson says, but is a "natural" for earth surveys. "In my personal opinion, it is the most stable platform man has ever designed." Along with three Lockheed test pilots who do the overflights--Robert Ericson, Ivor Webster and James Barnes--Knutson also flies the U-2.

The program is actually supported by a \$1 million Air Force contract with Lockheed. Knutson acts as technical monitor, and follows the plane to Wallops Island when it comes in for regular overflights of the Chesapeake Bay region. The other four designated regions are in Arizona, the San Francisco Bay area, the Lake Tahoe (California and Nevada) area and the Los Angeles area.

Although the overflight regions have a diversity of ecological characteristics, they are mainly in the west because both planes are based at Ames Research Center. The Chesapeake Bay region was

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LOCKHEED U-2, on loan to NASA from the Air Force, is being used by the space agency to simulate as closely as possible the data input of the Earth Resources Technology Satellite (ERTS), slated for the launch in 1972. This aircraft, one of two loaned U-2s, was flown to Wallops Island Va., from Ames Research Center in California for ERTS-related work (see story beginning on page 93).

U-2 (Cont.)

selected because its size and hydrologic environment cannot be matched in the west.

Lockheed provides the three pilots and support. The contractor effort in this program began shortly after the Air Force-to-NASA transfer was approved. The two U-2s were scrubbed down from an empty design weight of 14,100 pounds to 13,700 pounds but officials said that the removal of sophisticated Air Force electronics equipment and associated material actually amounted to more than 400 pounds.

One area of the plane that was emptied, and awaits use by NASA, is called the "canoe." It is the large ridge that flows from behind the canopy to the tail. The Air Force used it for electronic gear but it is not filled in the two NASA versions.

The blue-and-white U-2s have been carrying four Vinton British-made cameras in their sensor bays. The major function of the cameras, photographing in the green, red and near-infrared spectrum, is to duplicate the spectral response of the return-beam vidicon sensor (RBV) intended for Earth Resources Technology Satellites A and B. Because of high cost, NASA will not fly the RBV before year-long orbital missions in ERTS A and B.

Emphasis in the U-2 flights is on spectral response, not ground resolution, because as a television system the RBV will have less resolution than the U-2 cameras. Loss of resolution is accentuated by altitude--U-2 at 65,000 feet and the ERTS at almost 500 miles earth orbit.

The new U-2 effort provides an interesting contrast to an existing NASA high altitude aircraft survey program. For several years, the Manned Spacecraft Center in Houston, Tex., has been conducting earth surveys with an Air Force-owned and Air Force-piloted RB-57F modified by General Dynamics to carry a 4000-pound sensor package under the fuselage.

On loan from the Air Force Weather Service, the RB-57F can hit 60,000 feet on a four-hour photographic mission with at least ten times the sensor payload of the U-2s, but Knutson defends the Lockheed aircraft on several counts.

U-2 Provides More Stable Platform

Major improvement is stability, followed by range and altitude. Additionally, the U-2 requires only a pilot, instead of the two crewmen in the RB-57F, a pilot and a sensor operator. Knutson also believes that the NASA U-2s have an improved target sighting system using an optical reverse periscope that has to be treated with liquid nitrogen before take-off to prevent fogging in ascent. The RB-57F has a television system for the sensor package operator that may be changed to an optical periscope system, officials indicate, after the U-2 method.

The four U-2 cameras, using 70 millimeter film, are triggered automatically every 105 seconds once the target area is reached. The pilot has only to start the mechanism and stop it after his five to six-hour flight.

A major problem with the U-2 in earth resources surveys is the long turning radius required by the high-lift 80-foot wingspan. In current configuration, about one-third of the mission distance is used by turns and NASA is trying to reduce this, Knutson said.

An upcoming role for the U-2s will be preparation for the manned Skylab earth-orbital missions expected in 1973. At a greatly lower altitude than the automated ERTS A and B satellites, Skylab will carry a large earth resources sensor package that may be defined next week by the space agency.

U-2 program officials look for new overflights to develop "ground truth" for the Skylab sensor package, photographic and electronic.

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C. A. FOLTZ, formerly chief of aero technology, was appointed manager of missile engineering for the Missile Systems Div. of Engineering at Beech Aircraft Corp. He will be responsible for all technical activities of the division. Before joining Beech in 1967, Foltz was with Atlantic Research Corp., Costa Mesa, Calif.

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Aerospace Daily has written to OSD/PA requesting permission to write a review of the entire U-2 program now that the Air Force has

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FROM:	DATE
	22 Sept 71

The NSC Security Staff is preparing a reply for OSD/PA, indicating that the U-2's are still active in the Air Force, and that the data Aerospace Daily seeks is not available.

I will obtain a copy of the Aerospace letter & the reply.

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